



Crossroads LED
 10710 E. 119th Ct. N.
 Collinsville, OK 74021

QUOTE

Date	Estimate #
7/27/2018	0308

Name / Address
CITY OF GALLUP Accounts Payable P.O. Box 1270 Gallup, NM 87305

Ship To
CITY OF GALLUP Richard Matzke, Electric Director P.O. Box 1270 Gallup, NM 87305

Rep	Project No.
BAS	Acorn retrofit

Item	Description	Qty	U/M	Rate	Total
5100-ACRN-70-8T-SLP	70W, Acorn-style retrofit luminaire for slip fit-style fixtures; transparent globes (8 LED)	10	ea	675.00	6,750.00T
6000-DIFF-DSS	Acrylic diffuser with dark sky shield	10	ea	49.60	496.00T
Discount, Sales	Discount for payment by check on invoice #1173			-29.00	-29.00
<p>THIS QUOTE WILL REMAIN VALID FOR THIRTY (30) DAYS AND DOES NOT INCLUDE SHIPPING/FREIGHT OR DELIVERY CHARGES.</p> <p>Crossroads LED roadway products come with a full FIVE-year warranty, including custom designs.</p> <p>All domestic custom orders and FIRST TIME domestic customers require 50% advance payment due on order confirmation with remaining 50% due after shipment receipt. All INTERNATIONAL orders must be paid IN FULL prior to processing the purchase order.</p> <p>Crossroads LED, LLC will make every effort to expedite the order after receipt of purchase order and down payment (where applicable). However, Crossroads LED will not be responsible for unexpected delays by vendors outside of Crossroads LED's control. We will, however, keep the client apprised of any unforeseen or unexpected delays, should they arise</p>					

E-mail
accounting@crossroadsled.com

Subtotal	\$7,217.00
Sales Tax (0.0%)	\$0.00
Total	\$7,217.00



IES ROAD REPORT
PHOTOMETRIC FILENAME : LLI-18058-4.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] LLI-18058-4
[TESTLAB] LightLab International (www.LightLabInternational.com)
[MANUFAC] Crossroads LED, Collinsville, OK 74021
[LUMCAT] 5100-ACRN-70-4P
[LUMINAIRE] Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P
[MORE] Black extruded octagon tube.
[MORE] Four COB LEDs with semi-specular top reflector
[MORE] Two EPtronics LED drivers. Model: LN40W-72-C0550-RD
[MORE] Operating at 120 VAC and 60Hz.
[OTHER] Absolute test - lamp lumens value set to -1
[MORE] NA conventions used for C0 plane alignment and C-plane rotation direction.
[MORE] The sample was tested at a distance of 8m.
[MORE] This IES file created by LightLab/LSA Report program version 3.820a.
[DATE] This file created: Thursday, March 1, 2018 11:28:51 AM
[ISSUE DATE] Thursday, March 1, 2018 11:28:51 AM

CHARACTERISTICS

IES Classification	Type VS
Longitudinal Classification	Short
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	10499
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	132
Total Luminaire Watts	79.4
Ballast Factor	1.00
Upward Waste Light Ratio	0.35
Maximum Candela	1494.94
Maximum Candela Angle	45H 60V
Maximum Candela (<90 Degrees Vertical)	1494.94
Maximum Candela Angle (<90 Degrees Vertical)	45H 60V
Maximum Candela At 90 Degrees Vertical	1436.48 (13.7% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	1437.14 (13.7% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

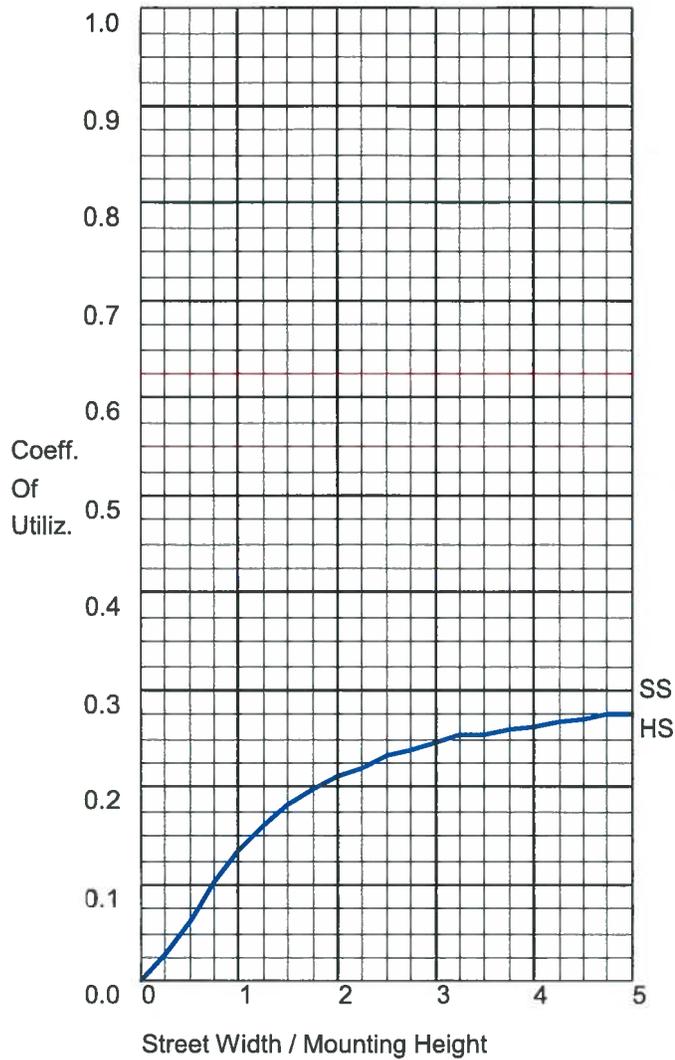
IES ROAD REPORT

PHOTOMETRIC FILENAME : LLI-18058-4.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	120.3	N.A.	1.1
FM - Front-Medium (30-60)	1297.9	N.A.	12.4
FH - Front-High (60-80)	1289.3	N.A.	12.3
FVH - Front-Very High (80-90)	679.0	N.A.	6.5
BL - Back-Low (0-30)	120.3	N.A.	1.1
BM - Back-Medium (30-60)	1297.9	N.A.	12.4
BH - Back-High (60-80)	1289.3	N.A.	12.3
BVH - Back-Very High (80-90)	679.0	N.A.	6.5
UL - Uplight-Low (90-100)	1349.9	N.A.	12.9
UH - Uplight-High (100-180)	2376.3	N.A.	22.6
Total	10499.2	N.A.	100.0
BUG Rating	B3-U5-G4		

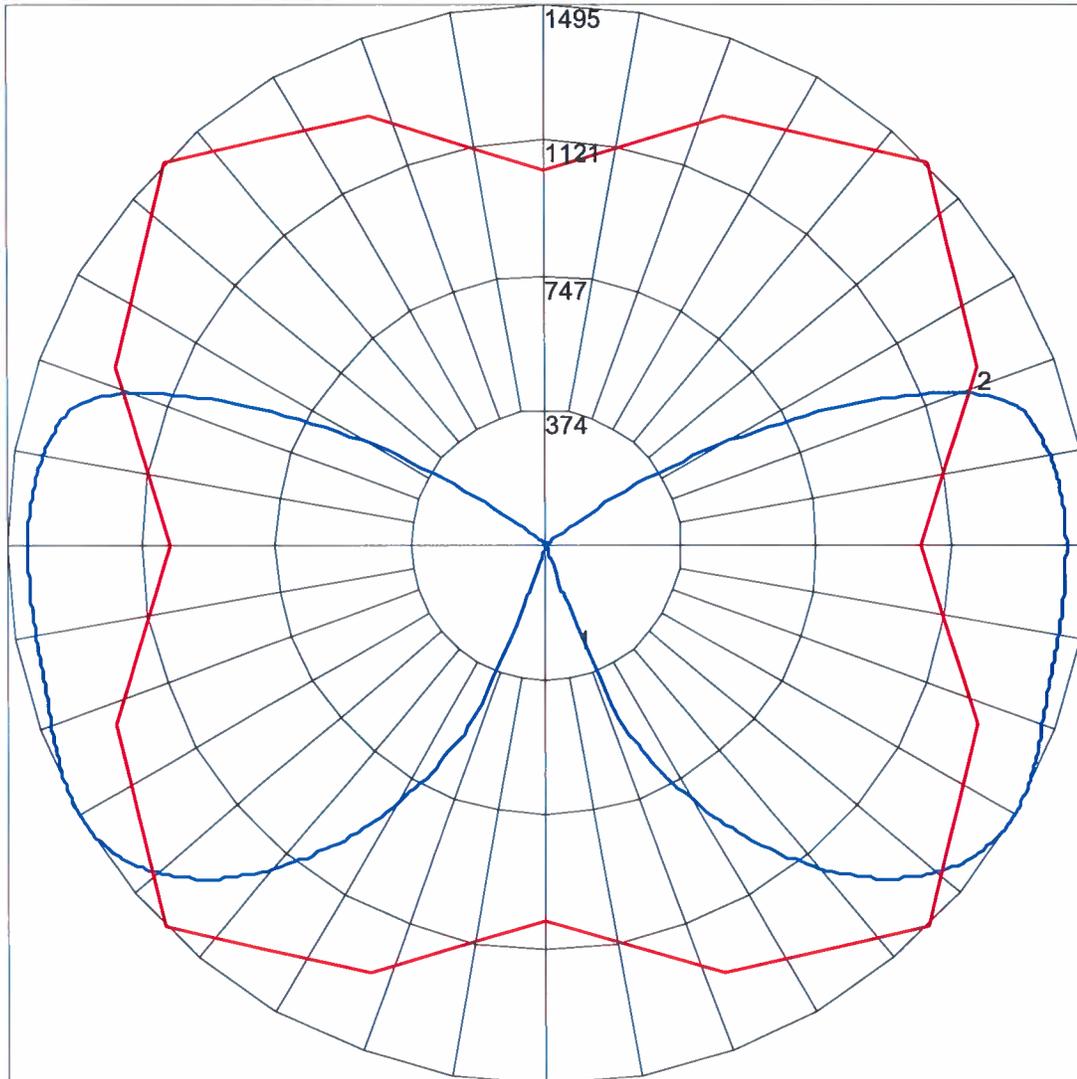
COEFFICIENTS OF UTILIZATION



FLUX DISTRIBUTION

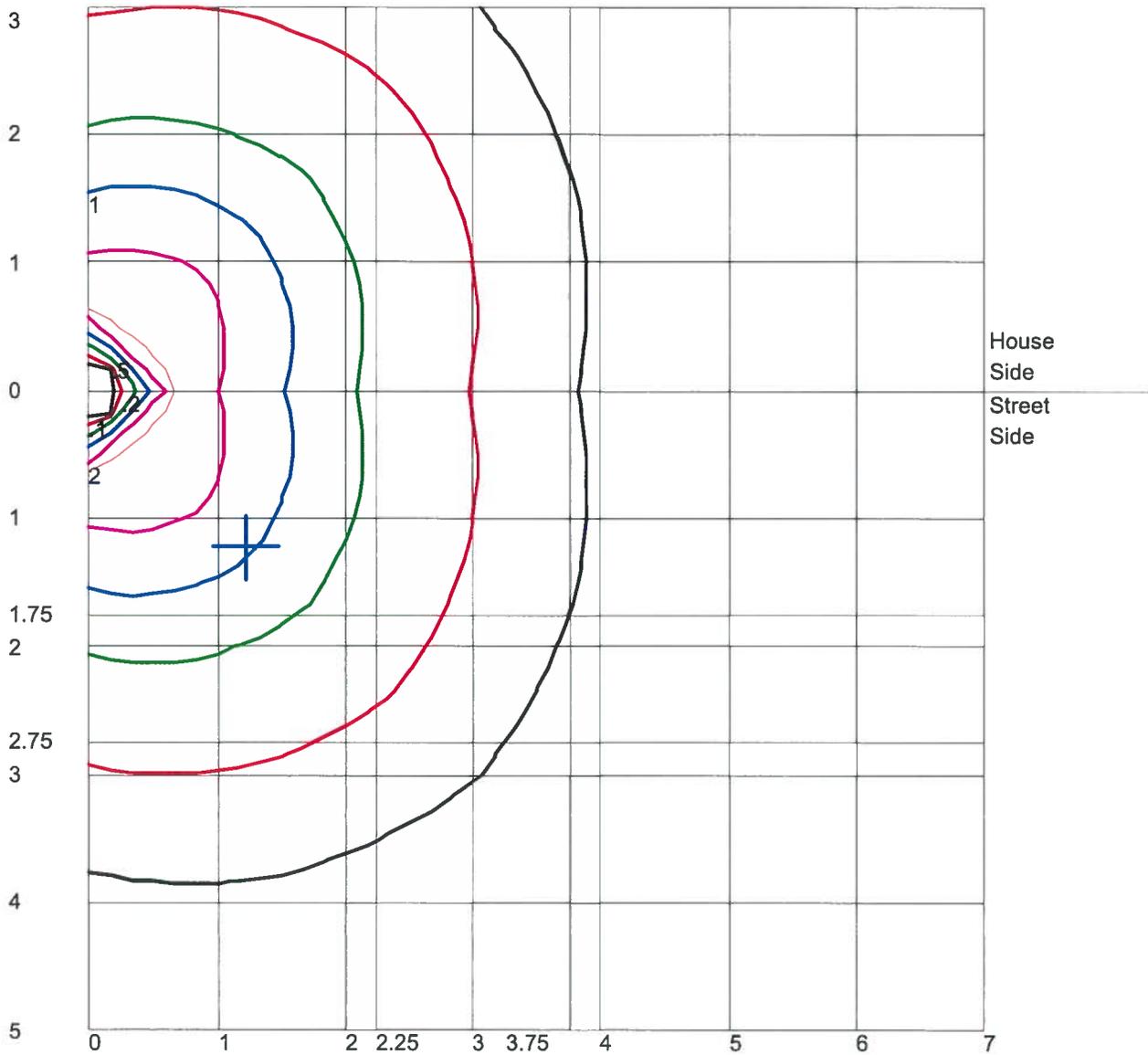
	Lumens	Percent Of Luminaire
Downward Street Side	3386.5	32.3
Downward House Side	3386.5	32.3
Downward Total	6773.0	64.5
Upward Street Side	1863.1	17.7
Upward House Side	1863.1	17.7
Upward Total	3726.2	35.5
Total Flux	10499.2	100.0

POLAR GRAPH



Maximum Candela = 1494.94 Located At Horizontal Angle = 45, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (45 - 225) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (60) (Through Max. Cd.)

ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
Values Based On 13 Foot Mounting Height
1/2 Maximum Candela Trace Shown As Dashed Curve
(+) = Maximum Candela Point



City of Gallup New Mexico

LED Acorn Retrofit lighting Specifications

1 LED ACORN RETROFIT LUMINAIRE REQUIREMENTS

- The power consumption of the LED luminaire shall not exceed $80W \pm 10\%$ as measured on the AC input (system wattage)
- The off-state power draw of the LED luminaire shall not exceed 2.50W.
- LED luminaires shall be able to operate in an ambient temperature range of -20C to 50C.
- LED luminaires shall be provided with a warranty for a period of five years.

2 HOUSING REQUIREMENTS

- The housing shall be primarily made of metal.
- The housing finish shall be rust resistant, powder coated, and green in color.
- The decorative globe shall be acrylic with a light distribution pattern in accordance with IESNA Type V.
- The minimum rating for ingress protection shall be IP54.

3 LED LUMINAIRE REQUIREMENTS

- The LED retrofit luminaire shall be designed to retrofit the existing acorn style fixtures utilized by the City of Gallup, NM.
- The retrofit luminaire shall utilize a non-medium or mogul socket method of installation and electrical connection. (LED luminaires with a screw-in base shall not be considered.)
- The retrofit luminaire shall incorporate a friction lock fastening system to secure the retrofit luminaire to the fixture housing.
- LED luminaires shall deliver a minimum of 10,500 lumens $\pm 1\%$. A LM-79 report by an accredited independent photometric testing facility will be required.
- LED luminaires shall have a minimum luminaire efficacy of 130 lumens per watt . A LM-79 report by an accredited independent photometric testing facility will be required.
- Minimum calculated L-70 light depreciation value of 80,000 hours is required. All L-70 data will be calculated utilizing A. LED manufacturer LM-80 report, B. ISTMT test report by an accredited independent photometric testing facility, and C. DOE TM-21 calculations.
- To control glare, the LED retrofit luminaire shall incorporate a frosted acrylic diffuser.
- To control up light, the LED retrofit luminaire shall incorporate a top mounted metallic light shield
- The assembly shall have a minimum rating of IP66.
- Each retrofit luminaire shall have a label identifying its catalog number, fixture wattage and LED drive current settings. Label will be attached on the retrofit luminaire and must be clearly visible.

4 POWER SUPPLY/ DRIVER REQUIREMENTS

- The minimum power factor of the power supply will be 0.90 or greater.
- The power supply shall have a maximum Total Harmonic Distortion (THD) of less than 20% at full input power and specified voltage range and shall conform to ANSI C82.77-2002.
- At an ambient temperature of 25C, maximum rating DC forward current shall not exceed 80% of the mA rating of the complete LED assembly in order to achieve specified light output requirements. Independent documentation required.
- The operating temperature of the power supply shall be between -20C and 50C.
- The power supply shall be mounted as low as possible in the fixture. The power supply shall not be mounted in the direct thermal path of, or directly over the LED heat sink(s).
- The power supply shall drive the LEDs with no perceived flashing or flickering.
- Transient protection per IEEE C.62.41-2-2002, Class A operation, I/P-O/P:3KVAC
- Power supplies shall meet consumer emission limits as described in FCC 47 CFR Part 15/18.

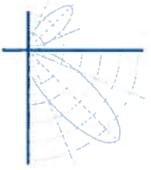
- The power supply shall have a Class A sound rating per ANSI Standard C63.4 and a minimum rating of IP66.

5 THERMAL MANAGEMENT REQUIREMENTS

- The thermal management system of the LED luminaire shall be passive in nature and not incorporate any mechanical means of active or forced cooling such as fans, pumps, or liquids of any kind.
- To maintain the longevity and reliability of the LED's and other components, the thermal management system shall maintain the LED die temperature at 80% of the manufacture's rated specifications. LED manufacturer LM-80 report, ISTMT test report by an accredited independent testing facility and DOE TM-21 calculations are required
- The thermal management system shall be resistant to debris buildup that does not cause degradation in its heat dissipation performance.
- Fixtures utilizing heat sinks that are mounted to the exterior of the fixture are not permitted.

6 COLOR REQUIREMENTS

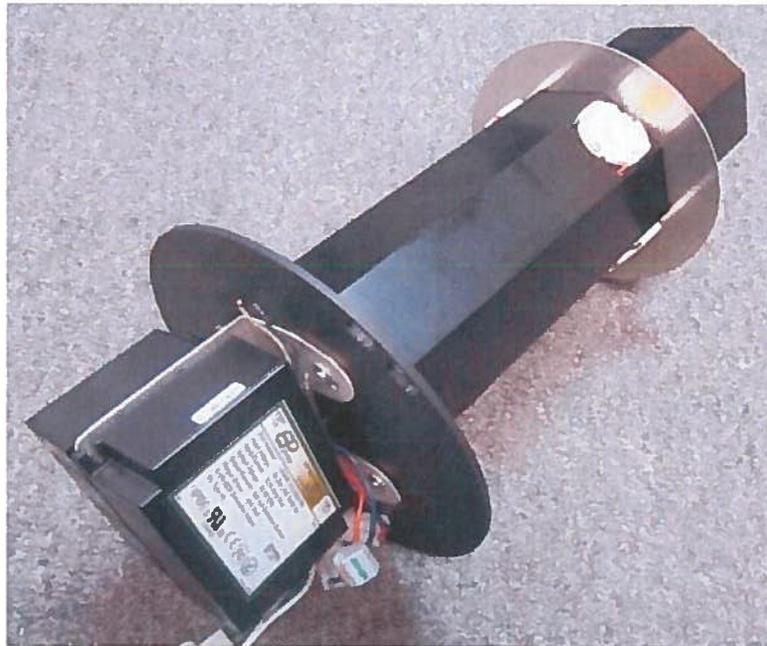
- LED luminaires shall be at nominal correlated color temperatures of 4000K
- LED luminaires shall have a minimum color rendering index of 80



Report of Test

LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P
Black extruded octagon tube.
Four COB LEDs with semi-specular top reflector
Two EPtronics LED drivers. Model: LN40W-72-C0550-RD
Operating at 120 VAC and 60Hz.



Performance Summary

Total Light Output	10499 lm	Power Factor	1.00
Luminaire Power	79.4 W	THD(i)*	2.7 %
Luminous Efficacy	132.2 lm/W		
CCT	4020 K		
CIE(x,y) 1931	(0.381, 0.380)		
CRI	84		

PREPARED FOR : Crossroads LED, Collinsville, OK 74021



Test Report No. LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P

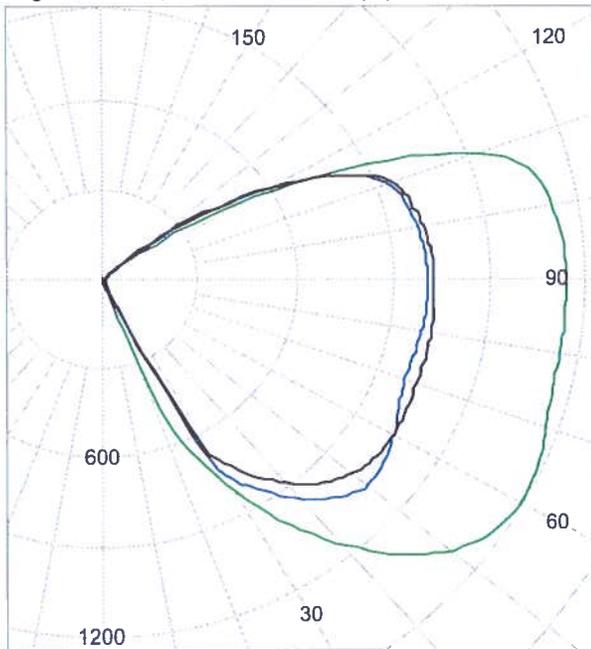
Black extruded octagon tube.

Four COB LEDs with semi-specular top reflector

Two EPtronics LED drivers. Model: LN40W-72-C0550-RD

Operating at 120 VAC and 60Hz.

Legend: C0-Black, C45-Green, C90-Blue (cd)



INTENSITY SUMMARY (cd)

Gamma	C-Plane					Flux (lm)
	C0	C22.5	C45	C67.5	C90	
0.0	0	0	0	0	0	
5.0	0	0	0	0	0	0
10.0	17	6	5	5	9	
15.0	12	13	19	16	8	12
20.0	58	156	182	164	59	
25.0	210	558	631	595	251	229
30.0	698	726	825	771	764	
35.0	804	877	1010	933	873	575
40.0	894	1005	1172	1061	965	
45.0	965	1115	1309	1170	1039	888
50.0	1012	1200	1413	1249	1071	
55.0	1035	1255	1476	1286	1064	1132
60.0	1042	1285	1495	1291	1041	
65.0	1039	1293	1485	1277	1012	1259
70.0	1034	1288	1460	1257	994	
75.0	1033	1281	1441	1247	996	1319
80.0	1032	1276	1437	1247	1003	
85.0	1030	1271	1437	1253	1008	1358
90.0	1027	1267	1436	1255	1008	

ZONAL FLUX AND PERCENTAGES

Zone	Flux (lm)	% Lamp	% Luminaire
0-30	241	N/A	2.3
0-40	816	N/A	7.8
0-60	2836	N/A	27.0
0-90	6773	N/A	64.5
40-90	5957	N/A	56.7
60-90	3937	N/A	37.5
90-180	3726	N/A	35.5
0-180	10499	N/A	100.0

Total Light Output = 10,499 lm

Signed:

Ryder Tunney
Ryder Tunney
Authorized Signatory

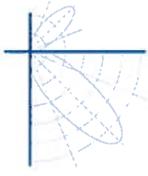
Date of test

1-Mar-2018

Date of report

1-Mar-2018

RT



LightLab
INTERNATIONAL

LightLab International, LLC
Phoenix AZ 85085



This document is issued in accordance with the accreditation requirements of NVLAP. The laboratory is accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to the SI system of units.

Test Report No. LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P

Black extruded octagon tube.

Four COB LEDs with semi-specular top reflector

Two EPtronics LED drivers. Model: LN40W-72-C0550-RD

Operating at 120 VAC and 60Hz.

Intensity data (cd)

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
0.0	0	0	0	0	0
2.5	0	0	0	0	0
5.0	0	0	0	0	0
7.5	4	0	0	0	0
10.0	17	6	5	5	9
12.5	30	17	7	15	30
15.0	12	13	19	16	8
17.5	21	45	80	45	26
20.0	58	156	182	164	59
22.5	90	295	522	332	102
25.0	210	558	631	595	251
27.5	443	648	727	689	514
30.0	698	726	825	771	764
32.5	753	803	921	854	822
35.0	804	877	1010	933	873
37.5	851	944	1093	999	920
40.0	894	1005	1172	1061	965
42.5	932	1063	1244	1118	1005
45.0	965	1115	1309	1170	1039
47.5	991	1161	1366	1215	1062
50.0	1012	1200	1413	1249	1071
52.5	1026	1231	1451	1272	1070
55.0	1035	1255	1476	1286	1064
57.5	1040	1273	1490	1291	1054
60.0	1042	1285	1495	1291	1041
62.5	1041	1290	1492	1286	1026
65.0	1039	1293	1485	1277	1012
67.5	1036	1291	1472	1267	1001
70.0	1034	1288	1460	1257	994
72.5	1033	1285	1449	1251	993
75.0	1033	1281	1441	1247	996
77.5	1032	1279	1438	1246	1000
80.0	1032	1276	1437	1247	1003
82.5	1031	1273	1437	1251	1006
85.0	1030	1271	1437	1253	1008
87.5	1028	1269	1437	1256	1008
90.0	1027	1267	1436	1255	1008



Test Report No. LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P

Black extruded octagon tube.

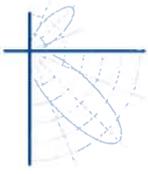
Four COB LEDs with semi-specular top reflector

Two EPtronics LED drivers. Model: LN40W-72-C0550-RD

Operating at 120 VAC and 60Hz.

Intensity data (cd)

Gamma	C-Plane				
	C0	C22.5	C45	C67.5	C90
90.0	1027	1267	1436	1255	1008
92.5	1025	1266	1436	1253	1007
95.0	1022	1262	1432	1249	1004
97.5	1018	1255	1425	1242	1000
100.0	1011	1245	1415	1233	992
102.5	1002	1230	1401	1218	985
105.0	992	1199	1380	1186	974
107.5	977	1150	1329	1136	961
110.0	952	1072	1227	1063	939
112.5	898	966	1080	960	890
115.0	818	836	909	833	816
117.5	717	692	732	692	720
120.0	608	549	550	550	612
122.5	492	416	371	418	498
125.0	375	298	203	302	381
127.5	257	186	75	192	265
130.0	143	89	14	94	152
132.5	54	26	6	29	61
135.0	10	7	0	7	13
137.5	6	4	0	4	6
140.0	0	0	0	0	0
142.5	0	0	0	0	0
145.0	0	0	0	0	0
147.5	0	0	0	0	0
150.0	0	0	0	0	0
152.5	0	0	0	0	4
155.0	4	4	4	4	4
157.5	4	4	4	4	4
160.0	4	4	4	4	5
162.5	4	4	4	5	5
165.0	5	5	4	5	5
167.5	5	5	5	5	5
170.0	5	5	5	5	5
172.5	5	5	5	5	5
175.0	5	5	5	5	5
177.5	5	5	5	5	5
180.0	0	0	0	0	0



Test Report No. LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P
Black extruded octagon tube.
Four COB LEDs with semi-specular top reflector
Two EPtronics LED drivers. Model: LN40W-72-C0550-RD
Operating at 120 VAC and 60Hz.

LM-79 Performance Data

Spectral	CIE 1931 (x, y) ⁽¹⁾	(0.381, 0.380)
	CIE 1976 (u', v') ⁽¹⁾	(0.224, 0.503)
	Correlated Color Temperature (CCT) ⁽¹⁾	4020 K
	Spatial Δ (u', v') Uniformity ⁽²⁾	0.0070
	Color Rendering Index (Ra) ⁽¹⁾	83.7
	Special CRI 9 (R ₉) ^{(1),(3)}	13.4
	Distance from Planckian Locus (Duv) ^{(1),(3)}	0.0016
	Scotopic/Photopic Ratio ^{(1),(3)}	1.70
Electrical	Voltage	120.0 V
	Frequency	60.0 Hz
	Current	0.665 A
	Power	79.4 W
	Power Factor	0.996
	Current THD	2.7 %

Performance data in accordance with IESNA LM-79-08. Spectral calculations are for a CIE 2° observer

- (1) Value is computed from the weighted average of the spatial measurements
- (2) Value is the maximum deviation of the spatial u' and v' measurements from the weighted average
- (3) Quantity is in addition to the scope of IESNA LM-79-08



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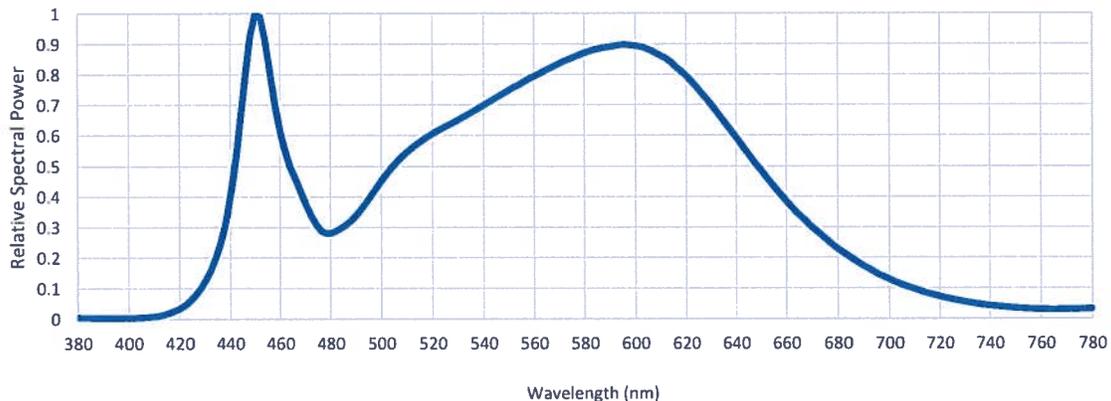
Two EPtronics LED drivers. Model: LN40W-72-C0550-RD

Operating at 120 VAC and 60Hz.

LM-79 Performance Data

Summary relative spectral irradiance distribution (wavelength – nm, irradiance – relative to peak = 1)

Table with 8 columns: Wavelength (nm) and Relative Spectral Power. The table lists data points from 380 nm to 780 nm in 5 nm increments. The peak relative spectral power is 1.000 at 450 nm.



The relative spectral power distribution combines the weighted spectral power distributions of all spatial measurements.



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LM-79 Performance Data

Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0° plane	Horiz. 90° plane
0.0	I <= 10% peak	I <= 10% peak
10.0	I <= 10% peak	I <= 10% peak
20.0	I <= 10% peak	I <= 10% peak
30.0	(0.225, 0.502)	(0.225, 0.502)
40.0	(0.225, 0.502)	(0.225, 0.502)
50.0	(0.225, 0.502)	(0.224, 0.502)
60.0	(0.224, 0.502)	(0.223, 0.502)
70.0	(0.224, 0.503)	(0.223, 0.502)
80.0	(0.224, 0.504)	(0.223, 0.503)
90.0	(0.224, 0.505)	(0.223, 0.504)

Spatial measurements

Vert. angle (°)	CIE 1976 (u',v') coordinates	
	Horiz. 0° plane	Horiz. 90° plane
90.0	(0.224, 0.505)	(0.223, 0.504)
100.0	(0.224, 0.504)	(0.223, 0.504)
110.0	(0.224, 0.503)	(0.223, 0.503)
120.0	(0.225, 0.504)	(0.223, 0.503)
130.0	(0.229, 0.508)	(0.227, 0.505)
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Test procedure

All measurements were performed in an environmentally controlled laboratory employing suitable baffling to minimize stray light. The sample was mounted in its normal operating orientation on a rotating mirror goniophotometer and operated from a stabilized supply. The photometric output was monitored and measurements were performed once stability was achieved.

The goniophotometer was used to measure the spatial distribution of both luminous intensity and, in conjunction with a spectroradiometer, spectral irradiance. The distribution locus comprises points in two or more planes (as indicated in the table above) at no more than 10° vertical intervals. The CIE (x,y) coordinates and other derived metrics (CIE (u', v'), CCT and CRI) are calculated from the weighted sum (weighted for intensity and represented solid angle) of the measured spectral irradiances.

Sample Orientation Vertical Stabilization & total operation time 1.0 / 2.0 hours

Equipment and uncertainties

LightLab International R80A C-gamma rotating mirror goniophotometer with a test distance of 8 m.

Luminous Intensity	± 4 %	Temperature	± 1 °C
Luminous Flux	± 4 %	Luminous Efficacy	± 4.5 %
Horiz., Vert. Angles	± 0.25°		

PhotoResearch PR-670 spectroradiometer (grating with 380 - 780 nm range, 2 nm / pixel, 5 nm bandwidth, incandescent/halogen calibration source). Measured at a distance from the sample deemed >5 times the maximum observed luminous opening dimension.

CIE (x, y) coordinates	± 0.003	CCT	± 100 K
CIE (u', v') coordinates	± 0.002	CRI (Ra)	± 2
Spatial Δ (u', v') uniformity	± 0.001	Scotopic / Photopic Ratio *	± 0.02
Rel. Spectral Irradiance *	± 2 %	R9 *	± 2
Duv *	± 5E-04		

Yokogawa WT210 power meter connected in circuit to the sample electrical supply

Voltage	± 0.5 %	Frequency *	± 0.1 Hz
Current	± 0.5 %	Power	± 0.5 %
Current THD *	± 3 %	Power Factor	± 0.02

This report contains data that are not covered by the NVLAP accreditation. Quantities marked with * are not covered.

Calculator / report version 1.0.7 / 5.7 (30th Jan 2017)



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Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P

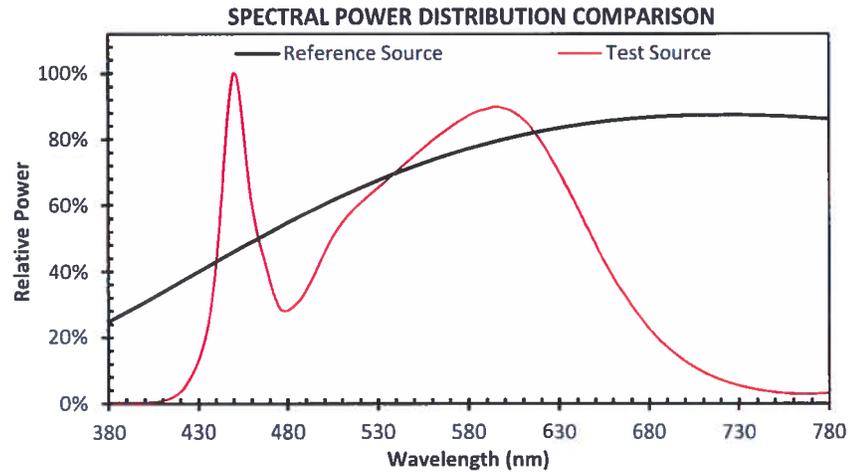
Black extruded octagon tube.

Four COB LEDs with semi-specular top reflector

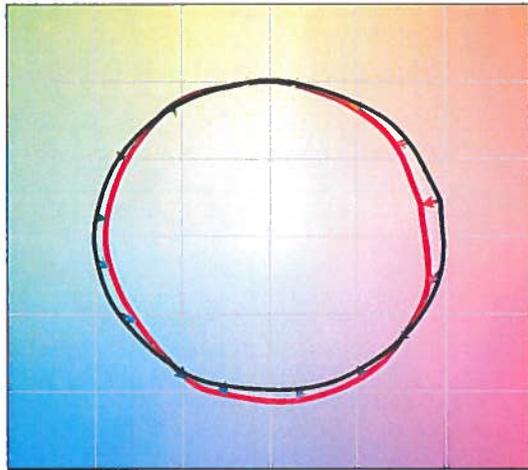
Two EPtronics LED drivers. Model: LN40W-72-C0550-RD

Operating at 120 VAC and 60Hz.

R_f	83
R_g	95



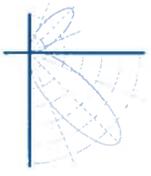
COLOR VECTOR GRAPHIC



— Test Source → Series1

COLOR DISTORTION GRAPHIC





Test Report No. LLI-18058-4

Crossroads LED - Post top retrofit kit. Product ID: 5100-ACRN-70-4P
Black extruded octagon tube.
Four COB LEDs with semi-specular top reflector
Two EPtronics LED drivers. Model: LN40W-72-C0550-RD
Operating at 120 VAC and 60Hz.

Test Distance 8.0 m
Test Temperature 25.5 °C

Notes The laboratory has not participated in the selection of samples to be tested. All testing is performed on the understanding that the significance of the report is limited to the extent that the test sample is representative of production units.

Tested in accordance with the applicable sections of publications: IES LM-79-08 (Sec. 12), IES LM-16-93, IES LM-58-13, CIE 13.3:1995, CIE 15:2004, ANSI C78.377:2015, ANSI C82.77-10:2014.

The luminous intensity values, and other derived quantities, contained in this report are based on the absolute data, as measured.

Prorating the performance of the sample for the use of other component combinations (such as lamp / LED / Ballast / driver), or for use in different environmental conditions than that tested, may produce erroneous results.

This report is free of erasures and corrections.

Photometric intensity values are reported using the CIE Gamma coordinate system as defined in CIE publication number 121.

This report may contain data that are not covered by the NVLAP accreditation. Quantities marked with * are not covered.

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the Federal Government.

